



Topical Fire Research Series

February 2002

Vol. 2, Issue 13

Federal Emergency
Management Agency
United States Fire
Administration
National Fire Data Center
Emmitsburg, Maryland
21727

OTHER RESEARCH TOPICS OF INTEREST

Arson in the United States,
Vol. 1, Issue 8, January 2001

Landfill Fires, Vol. 1, Issue
18, March 2001

Highway Vehicle Fires, Vol.
2, Issue 4, July 2001

Lightning Fires, Vol. 2, Issue
6, August 2001

Construction Site Fires, Vol.
2, Issue 14, November 2001

All reports in the Topical Fire
Research Series can be found at

[http://www.usfa.fema.gov/nfdc/
tfrs.htm](http://www.usfa.fema.gov/nfdc/tfrs.htm)

To request additional informa-
tion, or to comment on this
paper, visit

[http://www.usfa.fema.gov/
feedback/](http://www.usfa.fema.gov/
feedback/)

Rail Terminal Fires

FINDINGS

- An estimated 300 rail terminal fires each year cause \$300,00 in property loss. Civilian deaths are rare.
- Civilian injuries per 1,000 fires are higher than in all reported fires generally.
- Arson and smoking are the leading causes of subway fires; cigarettes are the leading ignition source (21%).
- 85% of rail terminal fires occur either at street level or in elevated terminals, and 70% of fires occur outdoors.
- Rail terminal fires peak in the spring/summer, roughly corresponding with increases in ridership during this period and with the overall pattern associated with outdoor fires.

Sources: NFIRS & NFPA

Nearly 1.5 million freight and passenger rail cars/locomotives are in operation in the United States.¹ They operate on thousands of miles of rails in stations and depots throughout the country. For the purposes of this report, the term *rail terminals* refers to street-level terminals, underground rail terminals, elevated rail terminals, and the cars/locomotives themselves as coded in the National Fire Incident Reporting System (NFIRS).

Between 1996 and 1998, there were an estimated 300 fires in rail terminals each year. These fires are responsible for less than 10 civilian injuries and approximately \$300,000 in fire loss annually.² Though not particularly common (less than one such fire per day), rail terminal fires generally receive a great deal of media attention as they often cause traffic delays and inconvenience. It should be noted that the low number of fires

reported to NFIRS may be more a result of the profile of fire departments reporting to NFIRS than an indicator of the frequency of rail terminal fires.

This topical report examines the causes and nature of fires that occur on rail terminal properties, including structure fires, refuse fires, and fires involving vehicles.

LOSS MEASURES

Figure 1 compares the loss measures for rail terminal fires to those measures for all reported fires. Fires in rail terminals are more injurious than fires generally. The reasons for this are not clear. One possible explanation for this is that the construction of rail terminals along railroad tracks does not allow for compartmentalization, which might restrict the movement of smoke and flame and reduce civilians' exposure to them. The relatively low dollar loss per fire is

indicative of the high proportion of fires that involve inexpensive combustibles such as rubbish/trash and newspapers/magazines.

WHERE FIRES START

Forty-five percent of rail terminal fires occur at street level, 39% occur in elevated terminals, and 16% occur underground. As shown in Figure 2, most rail terminal fires occur outdoors; nearly 44% are refuse fires and approximately 20% involve structures.

Figure 3 illustrates the leading areas of fire origin. Regardless of

the type of rail terminal, fires most often start on a railroad right-of-way, which includes railroad tracks and the area immediately adjacent to them.

Structure fires are more likely to originate in storage areas or in the

building's framing (consistent with electrical fires). Vehicle fires tend to be caused by arson or electrical distribution, with most fires originating in the engine compartment of the vehicle.

Figure 1. Loss Measures for Rail Terminal Fires
(3-year average, NFIRS data 1996–98)

LOSS MEASURE	ALL REPORTED FIRES	RAIL FIRES
Dollar Loss/Fire	\$5,619	\$1,064
Injuries/1,000 Fires	15.7	28.7
Fatalities/1,000 Fires	2.4	0

Source: NFIRS only

Figure 2. Types of Rail Terminal Fires
(3-year average, NFIRS data 1996–98, adjusted percentage)

TYPE OF FIRE	PERCENT OF FIRES
Outdoor	70
Structure	21
Vehicle	9

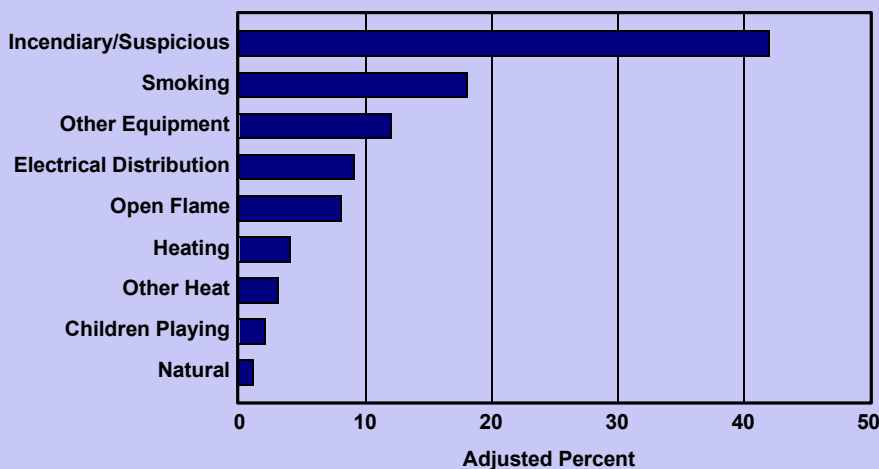
Source: NFIRS only

Figure 3. Leading Areas of Fire Origin
(3-year average, NFIRS data 1996–98, adjusted percentage)

AREA OF FIRE ORIGIN	PERCENT OF FIRES
Railroad Right-of-Way	18
Trash, Rubbish Area/Container Area	11
Engine/Wheel Area, Running Gear of Transportation Equipment	9
Lawn, Open Field	5

Source: NFIRS only

Figure 4. Leading Causes of Rail Terminal Fires
(3-year average, NFIRS data 1996–98)



Source: NFIRS only

CAUSES OF FIRES

Figure 4 illustrates the leading causes of rail terminal fires. Arson (incendiary/suspicious) is by far the leading cause of such fires, regardless of property type or location. Smoking also plays a significant role in rail terminal fires. Regardless of the cause, most rail terminal fires involve rubbish or trash.

Not unsurprisingly, the leading ignition source for rail terminal fires is a cigarette (21%). Other leading ignition sources are matches (9%) and electrical short circuits caused by worn insulation (5%). Matches are the leading ignition source for arson fires (about one-third).

TIME OF YEAR

Figure 5 illustrates the incidence of rail terminal fires by month. Peak months for fires are April and July, each with about 12% of total incidents. This pattern is consistent with the occurrence of outdoor fires (which comprise 70% of rail terminal fires). From previous USFA research, a seasonal pattern has been associated with increasing incidence of fire in the spring and summer months and a decline during the winter months. It is also interesting that these months roughly correlate with increases in ridership associated with fluctuations in the rate of tourism in major metropolitan cities.

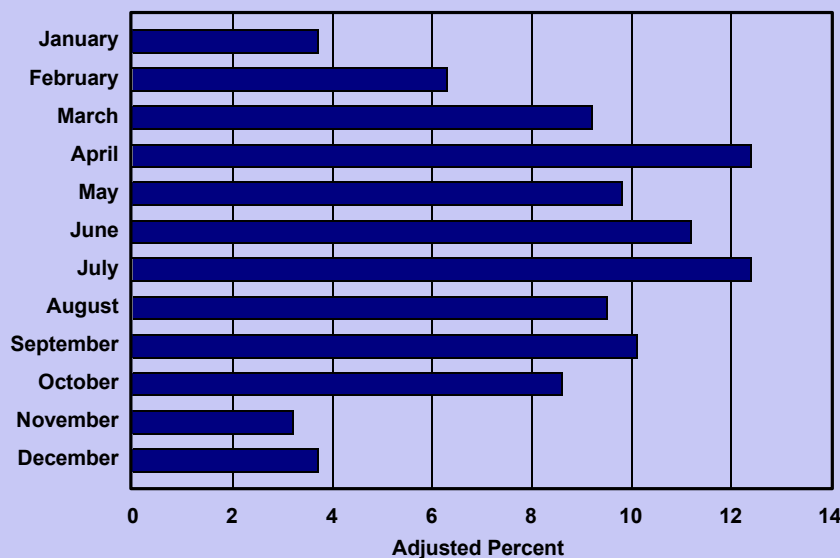
EXAMPLES

- In New York City, August 2000, a malfunction in a 600-volt power cable sparked a fire that disrupted rush hour train service for more than 3 hours.³
- In Washington, DC, June 2000, a loose vent door frame shook free from the concrete wall of a subway tunnel and fell onto the track bed

where it was run over by a passing train. The door frame ignited.⁴

- In New York City, July 1999, a three-alarm arson fire in a switching room trapped 2,000 commuters underground, causing 51 injuries and massive delays.⁵

Figure 5. Incidence of Rail Terminal Fires by Month
(3-year average, NFIRS data 1996–98)



CONCLUSION

The predominance of arson fires in rail terminals is disturbing. As with all fires, particularly arson, education aimed at the public and technological innovations should help reduce the already low incidence of rail terminal fires. For further information, contact your local fire department or the USFA.

To review the detailed methodology used in this analysis, click [METHODOLOGY](#)

Notes:

- ¹ *National Transportation Statistics 2000*, Bureau of Transportation Statistics. (http://www.bts.gov/btsprod/nts/AppA_web/Rail.htm, January 16, 2002)
- ² National estimates are based on data from the National Fire Incident Reporting System (NFIRS) (1996–1998) and the National Fire Protection Association's (NFPA's) annual survey, *Fire Loss in the United States*
- ³ Gonzalez, Carolina, "Fire Disrupts Four Subway Lines," *New York Daily News*, August 3, 2000.
- ⁴ Layton, Lyndsey, "Metro Fire Traced to Loose Vent Door," *The Washington Post*, June 22, 2000.
- ⁵ Farrell, Bill, "Subway Line Trash Fire Traps 2,000 on Trains," *New York Daily News*, July 2, 1999.